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The European Smoking prevention Framework Approach (ESFA): effects after 24 and 30 months

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Abstract

The European Smoking Prevention Framework Approach (ESFA) study in six countries tested the effects of a comprehensive smoking prevention approach after 24 (T3; $N = 10\,751$) and 30 months (T4; $N = 9282$). The programme targeted four levels, i.e. adolescents in schools, school policies, parents and the community. In Portugal, 12.4% of the T1 non-smokers in the control group had started smoking at T4 compared to 7.9% of the experimental group. Smoking onset in the experimental group was thus 36% lower. In Finland, 32.4% of the T1 non-smokers started smoking compared to 27.6% of the experimental group, implying a 15% lower onset in the experimental group. In Spain, 33.0% of the T1 non-smokers in the control group had started smoking, compared to 29.1% of the experimental group, implying a 12% lower onset. In The Netherlands, the ESFA programme was effective for non-native adolescents with 11.4% new weekly smokers compared to 19.9% in the control group. An opposite effect was found in native Dutch adolescents with 19.0% new weekly smokers in the comparison group compared to 24.0% new smokers in the experimental group. Future programmes should use more standardized ways to assess process evaluations and should assess which elements are responsible for behavioral effects.

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Introduction

Smoking prevention programmes using the social influence (SI) approach can be effective. However, effects have been shown to decay over time (US Department of Health and Human Services, 1994; Peterson *et al*., 2000). Sustaining the effectiveness of smoking prevention studies is therefore the most important challenge for current smoking prevention research. However, it is unclear which SI elements result in the (in)effectiveness of such programmes. Smoking prevention projects differ widely in their application of SI elements (De Vries *et al*., 2003c). For example, programmes differ not only in the number of skills-training sessions provided, but also in the attention afforded to covert and overt skills-training techniques (US Department of Health and Human Services, 1994; Dijkstra *et al*., 1999). Peer-led teaching methods appear promising; however, results are as yet inconclusive (Mellanby *et al*., 2000). Booster sessions may prolong effectiveness (Dijkstra *et al*., 1999), although not in all cases, and discussions about dosage (Glynn, 1989) are as yet not evidence-based (Peterson *et al*., 2000).

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Comprehensive community-based approaches have been shown to increase the long-term effects of smoking prevention programmes (Vartiainen *et al*., 1986; Perry *et al*., 1992).

The European Smoking Prevention Framework Approach (ESFA) used an integral preventive approach guided by best-practice principles (Glynn, 1989). It targeted adolescents in and out of school as well as their parents and the schools themselves (De Vries *et al*., 2003c). Short-term effects, 1 year after the pre-test, were found in Finland (smoking onset was 4.7% lower) and Spain (smoking onset was 3.1% lower). However, counter-productive trends were observed in Denmark and the UK (De Vries *et al*., 2003b). This paper describes the results of ESFA at 24 and 30 months after the pre-test.

Method

Sample and design

The ESFA was initiated in February 1997 as a community intervention trial, the community-based equivalent of a randomized control trial (Bracht, 1999). Regions within each participating country (Finland, Denmark, The Netherlands, the UK, Spain and Portugal) were approached to participate in the study and in the spring of 1998 were informed that they would be randomly assigned to the experimental or control condition. The National Project Managers (NPMs) then randomly assigned regions willing to participate in the project. Experimental regions received the ESFA project, while control regions received the usual care (De Vries *et al*., 2003c).

In Finland, 27 schools from in and around Helsinki were randomly assigned to the experimental (N = 13) and control (N = 14) conditions. In Denmark, two regions, each consisting of 30 participating schools, were randomly assigned to the experimental or control condition. In the UK, two health authority regions, consisting of 22 and 21 schools, respectively, were randomly assigned to the experimental and control condition. In Portugal, two regions were randomly assigned to the experimental (N = 14) and control (N = 11) conditions. A quasi-experimental design was used in The Netherlands and Spain, as randomization was not possible. In The Netherlands, many schools use a national smoking prevention programme. These schools were included in the control condition (N = 17) while the remaining schools (N = 16) were assigned to the experimental condition. In Spain, all 16 experimental schools were exposed to smoking prevention programmes in the past. The 31 control schools were situated in other districts and were not exposed to these programmes.

Respondents

In the fall of 1998 (T1), 1999 (T2) and 2000 (T3) as well as the early summer of 2001 (T4), questionnaires were distributed to participating schools. Students were invited to participate in the study. They read an introductory letter that indicated that their responses would be treated confidentially and that they could refuse participation at any time. Schools were notified when the questionnaires would arrive and should be filled out; students were not informed of the time when questionnaires would be distributed, thus avoiding biased dropout. Students completed the questionnaire in the classroom, placed their questionnaire in an envelope and sealed it themselves. The teacher placed all of the questionnaires in a larger envelope and sealed it in front of the class.

Questionnaire

The questionnaire was based on a review of the literature, 15 years of work on adolescent smoking behavior and revised according to pilots studies conducted by the NPMs in each country (De Vries and Kok, 1986; De Vries *et al*., 1988; De Vries, 1995; Dijkstra *et al*., 1999; Kremers *et al*., 2001).

Two primary outcome measures were used, i.e. ever-smoking and weekly smoking. These items were assessed by a combination of five questions that were cross-validated (De Vries *et al*., 2003b). Adolescents were categorized as never-smokers (never smoked a puff), non-smoking deciders (experimented with smoking, but had quit experimenting), experimental smokers (experimenting with smoking, but not smoking weekly), weekly smokers (smoking at least once a week), daily smokers

(smoking at least once a day) or as quitters (tried smoking at least weekly, but not smoking anymore). The validity of adolescent self-reported smoking is high in concordance with biological indicators when measurement assures anonymity (Dolcini *et al*., 1996). Hence, we optimized measurement conditions by assuring respondents of the confidentiality of their responses (Murray *et al*., 1987; Hansen, 1992; Dolcini *et al*., 1996).

Secondary outcomes in the study were the pros (six items on a seven-point scale; $\alpha = 0.65$) and cons of smoking (five items on a seven-point scale; $\alpha = 0.68$), social self-efficacy (three items about refraining from smoking in social situations; $\alpha = 0.94$), situational self-efficacy (three items about refraining from smoking in various situations; $\alpha = 0.93$), stress self-efficacy (three items measuring self-efficacy when stressed; $\alpha = 0.96$), and intention to smoke in the future (measured by one item). Other items included age, gender, pocket money, religious background, ethnicity, alcohol consumption, soft and hard drug use, family status (disrupted or not), parental occupation, social norms of parents, siblings and peers, social pressure to smoke from parents, siblings and peers, social modeling of smoking from parents, siblings and peers, parental reactions towards smoking, school achievement, school policy towards smoking, and if smoking was discussed during the previous year in school and at home. In order to conduct multilevel analyses, information regarding the respondents' class, school, municipality, region and country were recorded (De Vries *et al*., 2003b).

Intervention

For the first intervention year (1998–1999) a school-based programme was developed that included information on SI processes and training in refusal skills. Due to the fact that peer-led programmes were uncommon in the ESFA countries, programmes were teacher-led. During the second and third years of the study, classroom lessons were continued and the school, parental and out-of-school levels were elaborated. Programme development was guided through meetings with the NPMs, national board meetings and consensus meetings. As a result of these meetings, interventions were developed for four levels: the individual adolescent level, the school level, the parental level and the out-of-school level. Consensus was reached on core objectives and theoretical methods to be used. Due to differences in the availability of existing materials and country-level needs, the translation of objectives into practical didactic strategies differed per country. Furthermore, some countries added country-specific objectives to their programme (see Table I for country objectives). Further information on the programme content can be found elsewhere (De Vries *et al*., 2003b,c).

Table I shows the topics discussed during the project and Table II provides more detailed information on the activities per country. The range of school lessons regarding refusal skills and role-play differed amongst the countries. Teacher training differed greatly across the countries. The most intensive training was conducted in Portugal (48 hours) and Finland (20 hours). All countries developed and disseminated a school policy guide. Assessment of actual implementation of policies proved to be complicated and time-consuming. Pro-active offers of teacher smoking cessation were accepted by 54 teachers in Spain. All countries informed the parents about the project and its goals. Some countries initiated parent meetings (Finland, Denmark, the UK and Spain). However, attendance was very low. Most countries offered information to parents on how to discuss non-smoking with their children as well as smoking cessation for parents. However, only Spain and Portugal pro-actively offered parents cessation courses. In Spain, 'Quit and Win' was offered to parents in the third year; in Portugal, pharmacists offered cessation courses for 150 parents. In the first year of the study, all countries conducted access point analyses (Bullock *et al*., 1996) to ascertain where youngsters spent their free time. These results were used to plan out-of-school activities. All countries disseminated posters. Non-smoking activities were developed in out-of-school settings (e.g. at youth camps, sport clubs and discos) in Finland and Denmark. Behavioral journalism was chosen as the out-of-school approach in Finland (McAlister, 1995).

Table I. *Overview of activities presented to the experimental conditions of the ESFA project by country*

	Denmark	Finland	The Netherlands	Spain	Portugal	UK
Individual level						
total lessons	12	14	9	18	14	9
refusal skills training	+	+	+	+	+	−
public commitment to non-smoking	−	+	+	+	+	−
social pressure/influence	+	+	+	+	+	−
health consequences	+	+	+	+	+	−
power of tobacco advertisements	+	+	+	+	+	+
decision making	+	+	+	+	+	+
tobacco and environment	−	+	−	−	+	+
teacher training (hours) (credits)	no	yes (20)	no	yes (8)	yes (48)	yes (8) (no)
teacher manual	yes	yes	yes	yes	yes	yes
School level						
school-contact person(s)	no	yes	yes	yes	yes	yes
school policy manual disseminated	yes	yes	yes	no	yes	yes
posters	2	3	1	1	3	no
teacher smoking cessation materials offered	yes	no	yes	yes	yes	yes
smoke-free competition	no	yes	yes	yes	yes	yes
Parental level						
brochure about how to talk about smoking	yes	no	yes	yes	yes	yes
brochure about smoking cessation	yes	yes	yes	yes	yes	no
parent meetings	yes	yes	yes	yes	yes	no
courses offered (e.g. 'Quit and Win')	yes	no	no	yes	yes	yes
Out-of-school level						
posters	yes	yes	yes	yes	yes	yes
publication in local media	no	no	yes	no	yes	no
community actions for children	no	yes	yes	no	no	no

A '+' indicates that an item was addressed by the programme; a '−' indicates that an item was not addressed by the programme.

Analysis

Dropout from the study was assessed using logistic regression. Where significant interactions were found between the predictors and country, separate analyses were run per country. The *t*-tests assessed the extent of exposure to the lessons using items from the process evaluation. Differences between the experimental and control groups on attitudes, self-efficacy expectations and intention were analyzed using covariance analyses. Baseline smoking behavior (1 = weekly smoking, 0 = non-smoking) and the demographic variables described above were included as covariates. Adolescents who responded to T1 and T3 or T1 and T4 measurements, had answered at least 90% of the questionnaires, and did not have missing values in the outcome variable were included in the behavioral effect analysis (De Vries *et al.*, 2003b).

Due to the fact that subjects were nested within classes, schools, quarters, municipalities, regions as well as countries, logistic regression using multilevel procedures were used to analyze differences in ever and weekly smoking prevalence rates (De Vries *et al.*, 1994, 2003b; US Department of Health and Human Services, 1994; Dijkstra *et al.*, 1999). Non-significant predictors and interactions were deleted using a backward deletion procedure (α = 0.05), with the restriction that predictors were not removed from the model if they were involved as interaction terms. Demographic variables and the adolescent's attitudinal, self-efficacy and intention scores at T1 were included as covariates. Covariates were included to correct for potential baseline

Table II. *Program table*

	Individual level	Schools	Parents	Out of schools
Finland				
year 1	five lessons in total of which: two about refusal skills training three actual role-plays about refusing cigarettes no student manual four lessons on smoking prevention were integrated in regular subjects	teacher training teacher manual introduction of non-smoking school guide	information about ESFA class guidelines non-smoking competition	posters in public places behavioral journalism
year 2	five lessons in total of which: two about refusal skills training integrated lessons	quit materials for school personnel non-smoking competition teacher training	information about cessation parent meetings	posters in public places behavioral journalism smoke-free program in confirmation schools
year 3	four lessons in total one lesson about smoking cessation was given by school nurses who encouraged smokers to visit them	quit materials for school personnel non-smoking competition teacher and school nurse training	cessation brochure offered	community action: smoke-free confirmation camps of 2 weeks dental care intervention
Denmark				
year 1	six 1-hour lessons two about refusal skills training two actual role-plays about refusing cigarettes student manual	teacher manual to increase self-efficacy to deliver the program and general non-smoking information introduction of non-smoking school guide	information about ESFA how to talk about smoking cessation information	two posters and two postcards for kids non-smoking postcards sent to adolescents using positive non-smoking frames access point analysis inventory of youth clubs
year 2	six sessions on a special non-smoking theme day one actual role-play about refusing cigarettes two posters and two postcards sent to kids at school	information about ESFA and non-smoking to school boards dissemination of ESFA newsletters	information about ESFA information booklet about smoking and health	information for community youth leaders on how to talk to young people about smoking non-smoking parties
year 3	two lessons repeating the main messages about non-smoking	ESFA information to school board poster information about quitting	information about ESFA how to talk about smoking parent meetings	poster 2 months of TV non-smoking commercial

Table II. *Continued*

	Individual level	Schools	Parents	Out of schools
The Netherlands				
year 1	five lessons about the effects of smoking two lessons about refusal skills training	teacher manual no teacher credits for participation introduction of non-smoking school guide smoking robot to analyze cigarette substances for all ESFA intervention schools	information about ESFA cessation information	posters and flyers training of health educators who were responsible for teacher supervision access point analysis meetings/training for regional health organizations
year 2	two lessons about refusal skills training one lesson with refusal skills training in role-plays smoke-free school competition	non-smoking sports day non-smoking school guide check on smoke-free policy at school smoke-free school competition	how to talk about smoking brochure about quitting	non-smoking magazine sent to home address training of health educators non-smoking cards and stickers meetings/training for regional health organizations
year 3	two lessons about passive smoking and refusal skills training	dissemination of ESFA newsletter questionnaire about non-smoking policies brochure for adolescents on quitting check on smoke-free policy at school smoke-free school competition	brochure how to talk about smoking	regional non-smoking activities meetings/training for regional health organizations
UK				
year 1	five lessons of 30 minutes, none with refusal skills training computer games drama session where children interacted with actors on how to stick to your opinion	1 day of training teacher manual introduction of non-smoking school guide information about cessation		access point analysis
year 2	four lessons on cigarette industry tactics	non-smoking competition non-smoking school guide	how to talk about smoking	dissemination of an ID card for price reductions in shops and to reduce cigarette sales to young kids
year 3	one video lesson about developing refusal skills cessation information music CD about not smoking	cessation information	cessation information	ID card for price reductions in shops and to reduce cigarette sales to young kids

Table II. *Continued*

	Individual level	Schools	Parents	Out of schools
Portugal				
year 1	six lessons two on refusal skills training one lesson with refusal skills training in role-plays worksheets	48 hours training for school-contact teachers and implementing teachers teacher credits for participation introduction of non-smoking school guide poster 1 special non-smoking day to launch the project various non-smoking activities	information about ESFA (letter and newsletter) quiz on smoking with a price homework to be done with parents (related to the lessons)	non-smoking conference on National Non-smoking Day articles in local newspapers event on World No-smoking Day poster 1 access point analysis
year 2	six lessons of which two on refusal skills training one lesson with refusal skills training in role-plays worksheets	48 hours training for school-contact teachers and implementing teachers teacher credits for participation school policy manual dissemination poster 2 various non-smoking activities	brochure how to talk about smoking survey on home passive smoking 'Quit and Win' parents meetings newsletter	poster 2 events in the National Non-smoking Day and World No-smoking Day articles in local newspapers
year 3	one or two lessons by peer leaders trained of which: one or two on refusal skills training one lesson with refusal skills training in role-plays smoke-free class competition Internet chat with Barcelona students	teachers were trained to train 60 peer leaders poster 3 various non-smoking activities	parents meetings cessation brochure cessation counseling offered by pharmacists newsletter	pharmacist training pharmacists information about cessation poster 3 events on National Non-smoking Day and World No-smoking Day articles in local newspapers
Spain				
year 1	six lessons; including two videos about SIs and decision making two about refusal skills training two lessons with refusal skills training in role-plays student manual	teachers training of two workshops a teacher's guide	brochure about ESFA activities	posters access point analysis
year 2	seven lessons; two were about refusal skills training two lessons with refusal skills training in role-plays smoke-free class competition student manual	cessation programme was offered to teachers	brochure about ESFA activities invitation to parents	free-time organizations were invited

Table II. *Continued*

	Individual level	Schools	Parents	Out of schools
year 3	five lessons; two were about refusal skills training two lessons with refusal skills training in role-plays a student's folder with four comics Internet chat with Portuguese students	cessation programme was offered to teachers	brochure about ESFA activities brochure on how to speak about smoking with children	sports organizations and trainers received information on non-smoking posters and flyers

differences and to increase power. Previous research has shown the (potential) relationship of these covariates with smoking and the treatment condition (De Vries *et al*., 1994; US Department of Health and Human Services, 1994; Dijkstra *et al*., 1999; Ausems *et al*., 2002). A similar procedure was followed for the analyses of the T3 and T4 data.

Results

Response

At T1, the sample consisted of 19 034 non-smokers; at T3, the sample consisted of 11 119 respondents (58.4%). The final sample consisted of 10 751 adolescents (56.5% of 19 034) following the removal of respondents who had 10% or more missing values in their data or missing values in the outcome variables ($N = 368$). The response rates were lower amongst adolescents who were male, older, drank more glasses of alcohol per week, had mothers with a 5-day job, were from disrupted families, had higher school achievements and were non-native ($P < 0.05$). At T3, dropout rates were slightly higher in the experimental condition (44.6%) than in the control condition (44.2%), but did not differ significantly. In some countries, response rates were higher ($P < 0.05$) in the experimental group than in the control group (Spain: 83 versus 69%; UK: 39 versus 30%). Denmark reported a reversed pattern of response rates between the experimental and control groups (41 versus 60%).

At T4, 10 617 (55.8%) of the subjects who had participated at T1 responded to the study. Due to over 10% missing values in their data or missing values in the outcome variables ($N = 1335$), the final sample at T4 consisted of 9282 students (48.8% of 19 034). The response rates were lower among adolescents who were male, older, non-religious, with a mother working more than 5 days per week, had more pocket money and who had higher school achievements ($P < 0.05$). Dropout rates were slightly higher in the experimental condition (52.3%) than in the control condition (50.2%), but did not differ significantly. Denmark and Portugal reported a reverse pattern of response rates between

the experimental and control groups (45.9 versus 52.6% for Denmark and 41.7 versus 39.1% for Portugal). In Finland, two control group schools decided not to continue to participate in the program due to time constraints, resulting in a drop-out of 45.7% in the control condition versus 27.2% in the experimental condition.

Process evaluation

Inspection of progress reports and NPM minutes revealed that at the individual level, NPMs encountered the most difficulty in developing refusal skills activities, as they were not familiar with them. Schools and national organizations also found these activities to be too time consuming. Furthermore, NPMs were weary of the fact that repeating messages might become boring for adolescents, but found it hard to develop evidence-based alternatives to provide new information.

At the school level, monitoring of the school policy proved to be difficult. The negative attitude of teachers in Denmark towards smoking prevention activities hampered involvement of schools in that country. Most countries offered information on smoking cessation for parents, but few pro-actively offered cessation courses to them, the exception being Spain where 'Quit and Win' was offered in the third year.

With regard to the parental level, attempts to actively involve parents through parent meetings were met with low attendance. Brochures describing how to discuss smoking with children were popular. However, the level of usage could not be measured. The proactive recruitment of smoking parents into cessation activities was not successfully implemented in the majority of countries.

NPMs experienced great difficulty in developing effective out-of-school and community-based strategies. Hence, various strategies were used, but were often limited in their reach. Finnish adolescents appreciated behavioral journalism. In the UK, ID cards were distributed to non-smoking students giving them discount in shops; however, process evaluation data revealed that this technique was unsuccessful. Finally, all NPMs and contractors reported that the extensive delays in European funding greatly hindered the implementation of the programme. In fact, some NPMs were forced to seek alternative employment. Dutch participation in the project was delayed for a period of 6 months.

Exposure to smoking prevention activities

Table III shows that adolescents from the experimental condition reported exposure to more non-smoking activities than those from the control condition. Significantly more lessons on smoking prevention were implemented in the experimental schools at T3 and T4 than in the control schools. Portuguese (14.7) and Spanish (14.6) adolescents from the experimental group reported exposure to the most number of lessons, whereas adolescents from the UK (9.0), Finland (9.2) and The Netherlands (9.6) reported exposure to the lowest number of lessons. Whereas more experimental than control group adolescents were exposed to non-smoking activities in schools, the groups hardly differed in terms of their exposure to parental and out-of-school activities. The number of activities on smoking prevention at all four levels increased in both the experimental and control schools from T3 to T4.

Cognitive effects

At T3, the experimental group was significantly less convinced of the pros of smoking than the control group. This effect was significant in Finland, Portugal and Spain (see Table IV). Only significant effects were found for the cons in Portugal. Effects on self-efficacy were found for the Portuguese adolescents in that the experimental group felt more confident to cope with social pressures to smoke and to refrain from smoking in various situations (situational self-efficacy). The Portuguese experimental group reported more negative intentions to smoke in the next year than the control group. In The Netherlands, significant counter-effects occurred, showing lower situational self-efficacy and a negative intention in the experimental group.

At T4, a significant overall difference was found for social self-efficacy in that the experimental group felt more confident to refuse offers of cigarettes from friends than the control group. This

Table III. *Exposure to ESFA interventions, reported by pupils*

	Overall		Denmark		Finland		Netherlands		Spain		Portugal		UK	
After 24 months	E (N = 5318)	C (N = 5433)	E (N = 317)	C (N = 517)	E (N = 998)	C (N = 1136)	E (N = 996)	C (N = 1627)	E (N = 910)	C (N = 723)	E (N = 722)	C (N = 593)	E (N = 1375)	C (N = 837)
number of lessons[a]	8.1	4.7***	9.3	5.4***	6.8	3.7***	7.3	5.3***	11.8	3.8***	12.3	2.6***	7.1	6.4***
activities in lessons[b]	12.6	9.0***	10.8	6.6***	11.9	7.6***	15.8	13.1***	12.0	6.0***	10.9	3.3***	12.5	10.8***
activities in school[c]	4.0	1.9***	4.9	2.7***	6.5	1.8***	3.9	2.4***	3.5	1.7***	3.8	0.7***	2.5	1.8***
activities out of school[c]	3.6	3.5*	4.7	4.4	3.1	2.6***	3.9	3.7	3.6	4.1***	2.3	1.8***	4.5	4.5
talked at home about smoking[e]	2.5	2.4*	3.0	2.7*	2.1	2.2*	2.7	2.5	2.4	2.5	3.7	2.7***	2.1	2.0
subjects talked about at home[d]	5.0	4.8***	5.8	5.4*	4.8	4.6	5.0	5.0	5.1	5.2	5.6	4.2***	4.8	4.4**
After 30 months	E (N = 4536)	C (N = 4746)	E (N = 357)	C (N = 459)	E (N = 855)	C (N = 741)	E (N = 864)	C (N = 1437)	E (N = 658)	C (N = 540)	E (N = 694)	C (N = 610)	E (N = 1108)	C (N = 959)
number of lessons[a]	11.0	5.9***	10.9	6.4***	9.2	5.4***	9.6	6.1***	14.6	4.7***	14.7	3.2***	9.0	8.4**
activities in lessons[b]	16.6	11.1***	13.8	8.2***	16.0	10.3***	21.8	15.3***	15.9	7.6***	13.7	4.3***	15.9	13.0***
activities in school[c]	6.5	3.0***	7.1	3.7***	9.2	2.4***	6.5	3.4***	4.6	2.3***	6.5	3.4***	6.0	4.1***
activities out of school[c]	5.3	5.3	6.5	6.4	4.4	3.7***	6.1	5.6*	5.1	5.7**	3.0	2.3***	6.6	6.7
talked at home about smoking[e]	3.6	3.5	4.5	4.1	3.4	3.4	3.9	3.7	3.8	3.8	–	–	3.1	2.8*
subjects talked about at home[d]	7.5	7.3**	8.4	8.1***	7.1	7.1	7.4	7.4	7.8	8.0	8.1	6.5***	15.9	13.0

[a]0–15.
[b]0–16.
[c]0–13.
[d]0 = not talked at home; 1 = one or two subjects; 3 = three or more subjects.
[e]0 = did not talk about smoking; 1 = once; 2 = now and then; 3 = quite often; 4 = often.
*P < 0.05; **P < 0.01; ***P < 0.001.

Table IV. *Adjusted means (AM[a]) and effect sizes (ES[b]) of attitudes, self-efficacy and intention scores at 24 (T3) and 30 (T4) months[c]*

		Overall		Denmark		Finland		The Netherlands		Portugal		Spain		UK	
		AM	ES	AM	ES	AM	ES	AM	ES	AM	ES	AM	ES	AM	ES
After 24 months															
beliefs pros	C	0.03	*0.06*	0.00	*0.00*	0.04	*0.09*	0.00	*0.01*	0.06	*0.11*	0.09	*0.17*	−0.02	*−0.03*
	E	−0.03*		0.00		−0.05*		−0.01		−0.05*		−0.08***		0.01	
beliefs cons	C	−0.02	*0.04*	−0.02	*0.05*	−0.04	*0.09*	0.01	*−0.03*	−0.07	*0.12*	0.02	*−0.03*	0.03	*−0.05*
	E	0.02		0.03		0.05		−0.02		0.06*		−0.01		−0.02	
stress self-efficacy	C	0.00	*0.01*	0.04	*−0.10*	−0.04	*0.09*	0.01	*−0.02*	−0.09	*0.15*	−0.07	*0.11*	0.01	*−0.02*
	E	0.00		−0.06		0.05		−0.01		0.07**		0.05		−0.01	
social self-efficacy	C	0.01	*−0.01*	0.02	*−0.05*	−0.02	*0.05*	0.02	*−0.06*	−0.09	*0.16*	−0.06	*0.11*	0.01	*0.01*
	E	−0.01		−0.03		0.02		−0.04		0.07***		0.05		0.00	
situational-self-efficacy	C	0.01	*−0.02*	0.04	*−0.12*	−0.02	*0.05*	0.03*	*−0.09*	−0.07	*0.13*	−0.04	*−0.07*	−0.01	*−0.01*
	E	−0.01		−0.07		0.03		−0.05		0.06*		0.03		0.00	
intention to take up	C	−0.01	*−0.02*	−0.02	*−0.06*	0.02	*0.05*	−0.04	*−0.11*	0.07	*0.12*	0.05	*0.09*	−0.01	*−0.02*
smoking next year	E	0.01		0.04		−0.03		0.07*		−0.05*		−0.04		0.01	
After 30 months															
beliefs pros	C	0.04	*0.08*	0.03	*0.07*	0.00	*0.00*	0.00	*0.00*	0.10	*0.17*	0.04	*0.08*	0.02	*0.04*
	E	−0.04***		−0.04		0.00		0.00		−0.08**		−0.04		−0.02	
beliefs cons	C	−0.01	*0.01*	−0.01	*0.02*	0.01	*−0.02*	0.01	*−0.04*	−0.09	*0.16*	0.06	*−0.12*	−0.02	*0.04*
	E	0.01		0.01		−0.01		−0.02		0.07**		−0.05*		0.02	
stress self-efficacy	C	−0.01	*0.02*	−0.07	*0.14*	0.02	*−0.03*	0.01	*−0.04*	−0.08	*0.15*	−0.04	*0.07*	−0.02	*0.04*
	E	0.01		0.09		−0.01		−0.02		0.07*		0.04		0.02	
social self-efficacy	C	−0.02	*0.04*	−0.09	*0.18*	0.02	*−0.03*	0.00	*0.01*	−0.09	*0.16*	−0.05	*0.09*	−0.04	*0.08*
	E	0.02**		0.11*		−0.02		0.01		0.07**		0.04		0.04*	
situational self-efficacy	C	0.00	*0.01*	−0.08	*0.16*	0.01	*−0.02*	0.02	*−0.06*	−0.01	*0.02*	0.03	*−0.05*	−0.03	*0.06*
	E	0.00		0.10*		−0.01		−0.04		0.01		−0.02		0.03	
intention to take up	C	−0.01	*−0.03*	0.03	*0.07*	0.01	*0.01*	−0.02	*−0.07*	0.10	*0.17*	0.00	*0.01*	0.05	*0.09*
smoking next year	E	0.01		−0.04		−0.01		0.04		−0.08**		0.00		−0.04*	

[a]Means were adjusted for the baseline demographics and smoking status; means calculated using *z*-scores.
[b]Effect size interpretations are based on Lipsey (Lipsey, 1990) defining ES $\leqslant$ 0.32 as small, ES = 0.32–0.55 as medium and ES > 0.55 as large.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

effect was as a result of significant effects in Denmark, Portugal, Spain ($P < 0.10$) and the UK. The experimental groups from the UK and Portugal reported significantly more negative intentions to smoke in the next year than the respective control groups.

Table IV furthermore shows that most significant effects had effect sizes greater than 0.10. In Portugal, effect sizes larger than 0.10 were found for all the cognitive effects, apart from situational self-efficacy after 30 months. Overall, lower effect sizes were found for the pros (at both tests) and for social self-efficacy after 30 months.

Programme effects on ever-smoking and weekly smoking

Table V shows that overall differences between ever-smokers in the experimental group (44.8%) and the control group (44.1%) who were never-smokers at T1 were not significantly different at T3. Significantly fewer ever-smokers were found in the Portuguese experimental group (33.8%) than the control group (41.5%). A borderline counter-effect ($P < 0.10$) was found in The Netherlands, with slightly more ever-smokers in the experimental condition (41.7) than in the control condition (36.6). A similar trend was observed in Denmark (49.3% in the experimental group versus in the 43.6% control condition). With regard to experimental smoking at T4, 12% less ever-smokers were found in the experimental condition in Portugal ($P < 0.01$) and 4.4% less ever-smokers in Spain.

With regard to weekly smoking at T3, Table V shows that 18.4% of the non-smokers in the experimental group had begun smoking on a weekly basis compared to 18.8% of the non-smokers in the control group. The lowest percentage of weekly smoking was observed in Portugal (7.3% in the experimental group versus 9.1% in the control group). The highest percentages were found in

Table V. *New ever-smokers and new weekly smokers after 24 and 30 months*

	T1 never-smokers becoming ever-smokers		OR (95% CI)	$P <$	T1 non-smokers becoming weekly smokers		OR (95% CI)	$P <$
	E	C			E	C		
After 24 months								
overall	44.8	44.1	0.99 (0.90–1.09)	0.86	18.4	18.8	0.97 (0.69–1.08)	0.62
Denmark	49.3	43.6	1.41 (0.96–2.06)	0.08	21.8	19.1	1.30 (0.91–1.70)	0.18
Finland	49.8	51.3	1.00 (0.80–1.25)	0.99	24.8	30.1	0.76 (0.57–1.00)	0.05
The Netherlands	41.7	36.6	1.21 (0.98–1.49)	0.07	19.6	14.6	1.39 (1.10–1.76)	0.01
Portugal	33.8	41.5	0.73 (0.57–0.94)	0.02	7.3	9.1	0.74 (0.41–1.34)	0.75
Spain	48.9	52.8	0.89 (0.70–1.14)	0.36	18.4	18.5	0.96 (0.66–1.25)	0.75
UK	46.6	43.8	1.06 (0.85–1.33)	0.58	17.7	18.8	1.00 (0.75–1.25)	0.99
After 30 months								
overall	51.7	52.7	0.93 (0.84–1.03)	0.18	21.9	23.4	0.89 (0.80–0.99)	0.03
Denmark	51.5	48.7	1.15 (0.80–1.65)	0.45	20.2	21.8	0.96 (0.65–1.41)	0.83
Finland	56.7	54.9	1.23 (0.95–1.59)	0.12	27.6	32.4	0.79 (0.62–1.01)	0.06
The Netherlands	47.0	45.9	1.02 (0.83–1.27)	0.83	22.7	19.1	1.28 (1.01–1.63)	0.04
non-native Dutch					11.4	19.9	0.34 (0.15–0.78)	0.01
native Dutch					24.0	19.0	1.29 (1.02–1.63)	0.04
Portugal	41.8	53.8	0.62 (0.48–0.80)	0.00	7.9	12.4	0.56 (0.37–0.84)	0.01
Spain	64.5	68.9	0.75 (0.55–1.00)	0.05	29.1	33.0	0.80 (0.62–1.03)	0.08
UK	50.4	51.3	0.94 (0.76–1.16)	0.56	21.2	23.6	0.91 (0.73–1.14)	0.42

OR = odds ratio; CI = confidence interval.

Finland (24.8% in the experimental group versus 30.1% in the control group). The multilevel analysis showed significant differences in weekly smoking between the experimental (24.8%) and control groups in Finland (30.1%). A significant counter-effect was found in The Netherlands in that more adolescents smoked regularly in the experimental condition (19.6%) than in the control condition (14.6%).

With respect to weekly smoking, a significant overall effect was found at T4, showing 21.9% new smokers in the experimental group versus 23.4% new smokers in the control group. Significant differences were found in Portugal with less new weekly smokers in the experimental group (7.9%) than in the control group (12.4%). Borderline effects were found in Finland ($P < 0.06$) with 27.6% new smokers in the experimental condition versus 32.4% in the control group and in Spain ($P < 0.08$) with 29.1% new smokers in the experimental condition versus 33.0% new smokers in the control group. Only in The Netherlands was an interaction effect found, indicating differential significant effects for adolescents with a Dutch and non-Dutch origin. The Dutch ESFA programme was effective for non-native adolescents ($N = 289$) with 11.4% new weekly smokers compared to 19.9% new weekly smokers in the control group. An opposite effect was found in native Dutch adolescents ($N = 2012$) with 19.0% new weekly smokers in the comparison group compared to 24.0% new smokers in the experimental group.

Discussion

The ESFA study adopted a comprehensive approach that targeted smoking at four levels, i.e. adolescents, schools, parents and the out-of-school setting.

Significant effects were found for the pros of non-smoking 24 and 30 months after the pre-test, and for social self-efficacy after 30 months. In Portugal, significant effects on cognitions were found at 24 and 30 months on all indicators apart from situational self-efficacy at 30 months. Whereas significant effects were found in Portugal on the cognitions, and to a lesser extent in Spain and Denmark, relatively small effect sizes and insignificant changes were found in Finland, The Netherlands and the UK, which raised the question as to whether our interventions were powerful enough in changing the cognitions of smoking.

With regard to the behavioral effects, the results showed that at T4, 2.5 years after the initiation of the study, the project resulted in a significant, although marginal, effect in that 23.4% of the T1 non-smokers from the control group had become weekly smokers compared to 21.9% in the experimental group. This figure represents a 6% lower increase in smoking in the experimental group. The strongest effects were observed in Portugal where the findings imply that smoking onset was 36% lower in the experimental group than in the control group. Smaller effects were also observed in Finland and Spain. In Finland, the findings imply a 15% lower onset of smoking in the experimental group and a 12% lower smoking onset in the experimental group. The Dutch ESFA programme was effective for non-native adolescents, but an opposite effect was found in native Dutch adolescents. In conclusion, the significant behavioral effects of the programme found for Finland and Spain 12 months after initiation of the study (De Vries *et al*., 2003b) continued to exist, but reached borderline significance. The effects of the programme on regular smoking only became apparent after 3 years in Portugal. The latter observation illustrates the importance of continued implementation of actions and their evaluation to be able to detect sleeper effects. What may have caused the effects in the three countries? The skills-training components in the lessons may have contributed substantially to this effect, since they were well elaborated in these countries, but weaker in the UK and The Netherlands. The large number of lessons may also have contributed to the positive effect. Teacher training was also very well elaborated in the three countries. Teachers' commitment during the whole project was crucial in the countries, and required intensive coordination and involvement of different stakeholders, but also incentives for teachers to participate. In Finland, behavioral journalism probably

had substantial added value and was appreciated to a great extent. Moreover, the integration of the activities on all four levels, although innovative, was probably most successful in these three countries.

The ESFA project was the first to develop a best-practice smoking prevention approach at the European level that resulted in an efficacy study (Connelly *et al*., 2003). It was subject to several limitations. First, NPMs had to fulfill many roles (such as public relations, programme development and research), which restricted complete elaboration of all responsibilities. Although programme development was based on core objectives and theoretical methods, many differences emerged amongst the countries (De Vries *et al*., 2003b). Such differences were also noted in other SI projects (US Department of Health and Human Services, 1994; De Vries *et al*., 2003b). However, significantly more school activities were developed in the experimental schools. Second, random assignment was not possible in The Netherlands and Spain. The Spanish experimental schools had been already exposed to smoking prevention programmes. It is therefore plausible that the observed effects in our study may be the result of higher teacher motivation and experience. The lack of results in The Netherlands may be due to the fact that the control group participated in an existing drug abuse programme that is known to significantly reduce smoking behavior (Ausems *et al*., 2004). Third, the NPMs did not immediately recognize peer-led programmes as a viable alternative to teacher-led programmes, which have been shown to enhance programme effects (Telch *et al*., 1990; Klepp *et al*., 1993; Black *et al*., 1998; Erhard, 1999), although the results are still inconclusive (Mellanby *et al*., 2000). Peer leaders were included in the programme at a later stage in Portugal. Fourth, teacher training varied greatly. Countries that reported the strongest effects had spent much more time on teacher training, although this relationship was not tested experimentally. Intensive training and monitoring of teacher activities, while beyond the feasibility of our project, should be included in future projects (Peterson *et al*., 2000). Fifth, although overall response rates did not differ significantly between the experimental and control group, they did vary within countries and were sometimes higher in the experimental schools or in the control schools. Although it cannot be excluded that effects, e.g. in Barcelona and Portugal, may have been influenced by somewhat higher response rates in the experimental group, reports from teachers did not suggest that smokers deliberatively did not fill out questionnaires. Moreover, students were not informed in advance about the timing of questionnaire administration, and our process evaluation and the in-depth inspection of the data showed that dropout was mostly attributable to school dropout from the project due to time constraints (Finland, Denmark and the UK) or students failing to graduate to the next grade (Portugal). Although we provided newsletters to schools and NPMs contacted schools regularly, the necessity of smoking prevention as well as analyzing long-term effects may need more attention in future EU projects. An additional method may also be to provide financial incentives for participating schools, although our budget did not allow for this. Sixth, the development of out-of-school activities was not very successful as many access points had to be considered. Process evaluation during the various waves of the study across the six countries revealed that streets, shops, sport clubs, swimming pools and snack bars were the most popular places were adolescents spent their free time. In-depth analysis also revealed differing patterns of access points for smokers and non-smokers (De Vries *et al*., 2003b). Further research on access points is therefore required prior to the development of effective out-of-school prevention activities. Finally, delays in project funding seriously stalled programme development.

Connelly and colleagues also described strengths and weaknesses in their Commentary on the ESFA study (Connelly *et al*., 2003). First, Green (pp. 664–665) correctly indicated that the ESFA study illustrates the difficulty of obtaining appropriate control or comparison groups as well as random assignment in community trials. The 'golden' randomized controlled trial evaluation standard was not always feasible and appropriate as it did not account for the four levels of intervention, and

should have been supplemented at minimum with more focused process evaluation data [see also the comments of Green (p. 664), Lechner (p. 666) and Roberts (p. 672)]. At the outset of the project, we carefully planned process evaluation procedures including the development of logbooks for NPMs, teachers, school-contact persons and other intermediaries. The collection and analysis of such data, however, proved to be time intensive and received varying support amongst the countries. Moreover, capacity limitations at the national level hindered the in-depth analyses of the process evaluation. Hence, future European projects should allocate more funds to conduct in-depth process evaluation and employ more standardized ways to assess process data. Second, the strength as well as a limitation of ESFA is that it was an effectiveness study (Connelly *et al*., 2003). Our strength was that we were able to realize the development of a first EU project on smoking prevention with common goals, objectives and research methodology. A further strength was that real-life implementation showed the potential of the programme in three countries. Third, dissemination implies reinvention (Rogers, 1983). It is not always clear when adaptation renders new programmes. As Lechner stated (p. 667) in this Commentary (Connelly *et al*., 2003), in retrospect, many elements and adaptations should have been piloted before implementation. However, time and financial constraints prevented pilot testing. Fourth, our sample size estimations did not take into account the cluster research design (see Rigby's comment on p. 667), as in 1998 all the relevant information to make these calculations was not forthcoming. Fifth, programme reach, acceptability and integrity ranged from country to country (see Connelly's comment on p. 668). While it is always useful to anticipate these issues, the answers are not always that easy to find. While many of these issues were anticipated and extensively discussed during project development, controlling these elements sometimes proved to be extremely complicated. Finally, alternative approaches to the empirical approach are relevant (Connelly *et al*., 2003). Further research is required to demonstrate their effects.

What is recommendable; should we use best-practice or dismantling designs? We believe that two main streams of research should be promoted. First, we agree with Mittelmark (p. 667) that we need to consolidate 25 years of experience and disseminate the state-of-the-art science for tobacco prevention. The ESFA study attempted to achieve this for the first time in Europe and was partly successful. Research of this nature requires sound effectiveness, process evaluation and cost-effectiveness research as well as timely allocation of sufficient funds. Second, we disagree with Mittelmark's suggestion that dismantling studies are not needed. Although stated somewhat differently, Robert's comments (p. 672) in the same Commentary (Connelly *et al*., 2003) also point towards the need for dismantling research. Illuminative studies are needed, not for the sake of 'techno-tweaking' results, but to improve the quality of interventions and the understanding of working mechanisms. For instance, our Finnish behavioral journalism approach was innovative; however, we could not analyze its impact. Moreover, our study as well as other research showed that peer influences as well as other SI mechanisms may be operating simultaneously [e.g. the influences of parents and selection of friends (De Vries *et al*., 2003a)]. This requires adaptations of current approaches. In addition, the identification of causal factors of smoking onset does not automatically imply the identification of effective communication strategies. For example, we still need to discern which groups will benefit from self-efficacy-enhancing information and which groups will benefit from other types of information (e.g. attitude-reinforcing information). Prospect theory suggests differential impacts of gain and loss-framed messages (Kahneman and Tversky, 1984). Internet-based approaches are increasing in popularity. An understanding of how to best use this channel is therefore required. Furthermore, we need strong evidence indicating that a school-based approach will benefit from an integral approach, addressing teachers smoking behavior and school policies as well. Whereas it is logical to suppose synergetic effects, experimental evidence is scarce and is also needed to be able to better convince school management.

Finally, was the ESFA worth the effort? The project started collaboration at the EU level that was not reached before. Capacity building was realized with regard to program development and research methodology. This also allowed for additional analyses, such as comparing smoking stages in youngsters (Kremers *et al*., 2004), and analyzing the gateway hypothesis about smoking and alcohol (Wetzels *et al*., 2003), the importance of parents in addition to peers (De Vries *et al*., 2003a), and similarities in parenting rules (Huver *et al*., 2005) in the six EU countries. However, such efforts need to be continued and it is recommended to invest in a strong EU smoking prevention network that stimulates collaboration between the various EU members. However, this requires stronger proactive initiatives at the EU level than currently exist in order to be able to develop second-generation studies focusing on best-practice and/or experimental studies, and to be able to translate research findings into practice.

In sum, best-practice approaches use a 'container approach', which is somewhat inevitable. Consequently 'container programmes' limit the possibility of identifying elements that work best for particular groups of people. Hence, best-practice and innovative dismantling prevention studies are both needed. Collaboration at the European level has the potential to realize these objectives.

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Conflict of interest statement

None declared.

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